Horseshoe crab monitoring at Cape Cod National Seashore

by John Wullschleger and M. J. James-Pirri

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Enjoying a field-day retreat, NPS administrators from the Northeast Region lend their energies to the horseshoe crab spawning survey at Cape Cod National Seashore. Guided by NPS, USGS, and University of Rhode Island scientists, the managers measured and tagged crabs, which will allow researchers to estimate population size and assess migration. Left to right: Marie Rust (Northeast Regional Director), Johnnie Smith (Assistant to the Regional Director), Connie Rudd (Assistant Superintendent, Shenandoah National Park), Charles Roman (formerly with USGS, now with the North Atlantic Coast CESU), Beth Johnson (Regional Inventory and Monitoring Coordinator), Bob McIntosh (Associate Regional Director, Resource Stewardship, Planning, and Research), and Sandy Walter (Deputy Regional Director).

THE ATLANTIC HORSESHOE CRAB *(Limulus polyphemus)*, a species more closely related to spiders than to true crabs, inhabits coastal waters from Maine to the Yucatán peninsula. Although horseshoe crabs are not standard fare at seafood restaurants, they are economically and ecologically important. Horseshoe crabs are harvested for bait in conch and eel fisheries and to obtain limulus amebocyte lysate, a substance used by the biomedical industry. In addition to their intrinsic value, horseshoe crabs are an important link in the food chain. Adults are eaten by juvenile loggerhead turtles, a species that is federally listed as threatened, and the crabs' eggs, which are deposited on sandy beaches during high tides, are a preferred food item for many invertebrates, fish, and migratory birds. Horseshoe crab populations along the Atlantic Coast of the United States have recently been in decline. While the reasons for the coastwide decline are not known, human harvest is believed to be a contributing factor.

In 2000 concern over declining numbers led National Park Service managers to close Cape Cod National Seashore to the harvest of horseshoe crabs. This closure was initially opposed by the State of Massachusetts, which contended that the National Park Service usurped state authority to manage the harvest of fish and shellfish. It was subsequently determined that the closure was within NPS authority because horseshoe crabs are not classified by the state as either fish or shellfish. The national seashore currently remains closed to the harvest of horseshoe crabs; however, the issue underscores the need for better information about crab populations.

Park managers took the first step toward acquiring the information needed to manage and conserve horseshoe crabs by contracting with the University of Rhode Island to conduct spawning surveys in 2000 and 2001. The work was partially funded by the NPS Biological Resources Management Division and conducted in cooperation with the Massachusetts Audubon Society and the U.S. Fish and Wildlife Service. Surveys were undertaken on beaches and in other habitats during high tides from May through July. Researchers collected data to estimate spawning densities, sex ratios, and egg densities. Spawning crabs were measured and classified by age group based on the appearance of their hard outer covering, known as the carapace (carapaces of older crabs show greater wear and higher numbers of encrusting organisms). Crabs were also marked with plastic tags that allowed researchers to estimate population size and assess migration.

The final report, "Population Demographics and Spawning Densities of the Horseshoe Crab, *Limulus polyphemus*, within Cape Cod National Seashore, Cape Cod Bay and Monomoy National Wildlife Refuge, Massachusetts," notes that spawning densities were low at most sites. The highest spawning densities were observed in Monomoy National Wildlife Refuge, followed by Pleasant Bay in Cape Cod National Seashore. Size and age structure varied among locations, with the largest crabs of both sexes found at the wildlife refuge, followed by Pleasant Bay. Overall egg and larval densities were also low and were not correlated with spawning density. Recapture data for tagged crabs indicated that a few individuals traveled long distances, and the close proximity of most recaptured crabs to their original location suggests that spawning populations are generally discrete.

Although the demographic and density data cannot currently be tied to particular causes, this information provides a basis for identifying future trends in crab populations in Cape Cod National Seashore and the surrounding area. Better understanding of population dynamics and spawning densities of the Atlantic horseshoe crab will allow the National Park Service to make management decisions that protect the species, ensuring its continued contribution to the region's ecosystem and economy. ■

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